

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>PC 04 022 H</b>	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. <b>PCT/EP2004/008309</b>	International filing date (day/month/year) <b>24.07.2004</b>	Priority date (day/month/year) <b>30.07.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>G01N27/414</b>		
Applicant <b>MICRONAS GMBH</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a. ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/008309

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-9 \_\_\_\_\_ as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 1-11 \_\_\_\_\_ received by this Authority on 08.04.2005 with
- nos.\* \_\_\_\_\_ received by this Authority on telefax
- ☒ the drawings:
- sheets 1/5-5/5 \_\_\_\_\_ as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/008309

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	1-11	YES
	Claims		NO
Inventive step (IS)	Claims	1-11	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-11	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D2: BURGMAIR M ET AL: "Contribution of the gate insulator surface to work function measurements with a gas sensitive FET"

D3: DE 101 18 367 A

D6: US-A-5 900 128

D8: DE 101 61 214 A

D10: POHL R ET AL: "Realization of a new sensor concept: improved ccfet and sgfet type gas sensors in hybrid flip-chip technology".

2. The present application satisfies the requirements of PCT Article 33(1) because the subject matter of claim 1 is novel and inventive (PCT Article 33(2) and (3)).

D2 discloses a gas sensor as per the preamble of claim 1 (figure 2, a hydrophobic passivation layer ( $\text{Si}_3\text{N}_4$ ) being placed on the surface of the gas sensor, said layer\*\* being located between the gas

---

\*\* As can be seen from D1,  $\text{Si}_3\text{N}_4$  layers are designated as hydrophobic layers (abstract).

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

gas sensitive layer and the channel region. (The preamble of claim 1 is also disclosed in **D3** (see abstract, figure 1, paragraphs [0012-0017], claims 1-4)).

The subject matter of claim 1 differs from that of **D2** in that an insulation layer (17) is placed on the drain (3) and the source (4), a hydrophobic layer (19) being placed on this insulation layer and the statistical contact angle of said layer, measured with water, being at least 90°.

The technical effect thus produced is that of impeding, or totally preventing, the adsorption of humidity on the surface of the FETs, the wetting performance of water on the hydrophobic layer being established. The conventional (hydrophobic) passivation  $\text{Si}_3\text{N}_4$  layers are more simply wetted by water (see the applicant's addendum of 8 April 2005) than the hydrophobic layer proposed in this application and therefore have a greater lateral sensitivity to moisture.

None of the documents cited in the report discloses a solution such as that proposed in claim 1. Passivation layers in FET technology are generally a combination of  $\text{SiO}_2$  and  $\text{Si}_3\text{N}_4$  (**D2**, figure 2; **D8**, paragraph [0063]; **D10**, figure 4)) or polyimide (**D6**, column 4, lines 1-10). However, their contact angles are in the region of 60°.

/...

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/008309

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

Although **D3** discloses a gas sensor as per the preamble, with "insulating" surface profiling formed on the insulation layer, said document does not disclose the material from which the profiling is made. Many electrically insulating layers, such as alumina etc., are not hydrophobic and therefore have a contact angle that is greater than 90°.

Thus, a person skilled in the art would not use a material of this kind nor arrive in this way at the subject matter of claim 1, without an inventive step.

In consequence, dependent claims 2-11 are also considered to be novel and inventive.

## Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

## 1. PCT Article 6

## 1.1 Claim 1 lacks clarity for the following reasons:

It is clear from the description and from figures 1-5 that the following feature is essential for the definition of the invention:

an electrical insulation layer (17) is deposited on the directly or indirectly hydrophobic layer (19). Independent claim 1 does not contain this feature and said claim therefore fails to comply with the requirement of PCT Article 6 in conjunction with PCT Rule 6.3(b) that every independent claim must contain all the technical features which are essential for the definition of the invention. The characterising part of claim 1 lacks clarity. Claim 1 is characterised in that a hydrophobic layer is placed on the surface of the gas sensor. According to said claim, this layer is located between the gas-sensitive layer and the channel region and/or a sensor electrode that is electrically connected to a gate electrode in the channel region. However, it can be seen from drawings 1-4 that the hydrophobic layer (19) is located not between the gas-sensitive layer and the channel region (8) and/or a sensor electrode (16) (which is connected to a gate electrode in the channel region) but adjacent thereto. Moreover, the expression "on the surface of the

/...

Box No. VIII Certain observations on the international application

gas sensor" would mean that the hydrophobic layer has to be either over the pole (11) or under the substrate (2) according to drawing 2. This is not the case.

Moreover, the expression "and that the hydrophobic layer in the surface of the gas sensor [**German text unclear: betrachtet**]" is placed between the gas-sensitive layer and the channel region and/or a sensor electrode" lacks any clarity. In order to assess novelty and inventive step, the unclearly drafted claim, claim 1, has been interpreted in the light of figures 1-5 and the description (see in particular page 7, line 27 to page 8, line 12). The construction of the gas sensor is described therein in a clear and unambiguous manner. Moreover, the electrical insulation (17) has been taken into account as an essential feature of the invention.

#### 1.2 Miscellaneous

Expressions such as "preferably" (for example in claims 5 and 8) do not restrict the scope of protection of the claim. Any features preceded by such an expression have therefore been considered entirely optional.